



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



C. HEIDI GRETHUR
DIRECTOR

October 3, 2016

Mr. Richard J. Powals, P. E., Vice President
Environmental GEO-Technologies, LLC
28470 Citrin Drive
Romulus, MI 48174

Dear Mr. Powals:

SUBJECT: Mechanical Integrity Testing, EDS No. 2-12, Permit No. M453

As required by R 299.2393, of the administrative rules promulgated under authority of Part 625, Mineral Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), on July 25, 2016 and August 8, 2016, mechanical integrity testing on the subject well was conducted under the direction of Mr. Richard Schildhouse of WSP-Parsons Brinckerhoff. External mechanical integrity was demonstrated using a temperature log and radioactive tracer log. The logs were not witnessed by a representative of the Department of Environmental Quality.

I have examined the wireline logs; they indicate the well has external mechanical integrity.

Use of the EDS No. 2-12 well may be resumed at your convenience. Please note the United States Environmental Protection Agency (USEPA) has issued a permit for this well and may require it to remain off line until USEPA personnel have examined the test results.

If you have any questions about the above, please contact me by mail at Department of Environmental Quality, Office of Gas, Oil, and Minerals, P.O. Box 30256, Lansing, MI 48909, by phone at 517-284-6841, or by email at vugrinovichr@michigan.gov.

Sincerely,

Raymond Vugrinovich, Geologist Specialist
Minerals and Mapping Unit

cc: Ms. Lisa Perenchio, USEPA
Mr. Richard Schildhouse, WSP-Parsons Brinckerhoff
Mr. Lou Schineman, DEQ



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



C. HEIDI GRETHUR
DIRECTOR

October 3, 2016

Mr. Richard J. Powals, P. E., Vice President
Environmental GEO-Technologies, LLC
28470 Citrin Drive
Romulus, Michigan 48174

Dear Mr. Powals:

SUBJECT: Mechanical Integrity Testing, EDS No. 1-12, Permit No. M452

As required by R 299.2393, of the administrative rules promulgated under authority of Part 625, Mineral Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), on July 25, 2016 and August 8, 2016, mechanical integrity testing on the subject well was conducted under the direction of Mr. Richard Schildhouse of WSP-Parsons Brinckerhoff. External mechanical integrity was demonstrated using a **temperature log** and **radioactive tracer log**. The logs were not witnessed by a representative of the Department of Environmental Quality.

I have examined the wireline logs; they indicate the well has external mechanical integrity.

Use of the EDS No. 1-12 well may be resumed at your convenience. Please note the United States Environmental Protection Agency (USEPA) has issued a permit for this well and may require it to remain off line until USEPA personnel have examined the test results.

If you have any questions about the above, please contact me by mail at Department of Environmental Quality, Office of Gas, Oil, and Minerals, P.O. Box 30256, Lansing, MI 48909, by phone at 517-284-6841, or by email at vugrinovichr@michigan.gov.

Sincerely,

Raymond Vugrinovich, Geologist Specialist
Minerals and Mapping Unit

cc: **Ms. Lisa Perenchio**, USEPA
Mr. Richard Schildhouse, WSP-Parsons Brinckerhoff
Mr. Lou Schineman, DEQ

**REPORT OF MECHANICAL INTEGRITY
OF INJECTION WELL #2-12**

ENVIRONMENTAL GEO-TECHNOLOGIES, LLC
Romulus, Michigan

PROJECT NO.: 50909A

SEPTEMBER 2016

Prepared By:

WSP | PARSONS BRINCKERHOFF
54520 Northern Avenue, Unit A
South Bend, Indiana 46635

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	SUMMARY OF RESULTS	1
3.0	ANNULUS PRESSURE TESTING	2
3.1	Annulus Pressure Test Procedures.....	2
3.2	Annulus Pressure Test Results	2
4.0	TEMPERATURE SURVEY.....	3
4.1	Temperature Survey Procedures	3
4.2	Temperature Survey Results.....	3
5.0	RADIOACTIVE TRACER SURVEY.....	5
5.1	Radioactive Tracer Survey Procedures.....	5
5.2	Radioactive Tracer Survey Results	5
6.0	AMBIENT PRESSURE MONITORING.....	7
6.1	Ambient Pressure Monitoring Procedures.....	7
6.2	Ambient Pressure Monitoring Results	7
7.0	CONCLUSIONS	12

TABLES

TABLE I:	General Well and Reservoir Information
TABLE II:	Data Summary for the Injection Period
TABLE III:	Data Summary for the Falloff Period
TABLE IV:	Comparison of Analysis Results

TABLE OF CONTENTS (CONTINUED)

FIGURES

- FIGURE 1: Test Overview
- FIGURE 2: Fall-Off-Cartesian Plot
- FIGURE 3: Log-Log Plot
- FIGURE 4: Radial Flow Plot
- FIGURE 5: Expanded Radial Flow Plot
- FIGURE 6: Well Schematic

APPENDICES

- APPENDIX A: Regulatory Correspondence
- APPENDIX B: Chronology of Field Activities
- APPENDIX C: Pressure Test Report and Calibration Certificate
- APPENDIX D: Annulus Pressure Test Data and Calibration Certificate
- APPENDIX E: Pan System Analysis Output
- APPENDIX F: Temperature Log
- APPENDIX G: Radioactive Tracer Log
- APPENDIX H: Temperature, Radioactive Tracer and Ambient Pressure Test
Digital Data

1.0 INTRODUCTION

In accordance with the United States Environmental Protection Agency's (U.S. EPA), requirements for the Class I UIC permit number MI-163-1W-CO11 granted to Environmental Geo-Technologies, LLC (EGT) and with the State of Michigan permit number M-453, an annulus pressure test, temperature survey, radioactive tracer and ambient pressure test was needed to be run on Well #2-12 to demonstrate the mechanical integrity of the well.

The mechanical integrity tests (MITs) are designed to demonstrate that (1) "there is no significant leak in the casing, tubing or packer" and (2) "the cement at the top of the injection interval has integrity." The test procedures to perform mechanical integrity tests were reviewed and approved by the U.S. EPA and the Michigan Department of Environmental Quality (MDEQ) prior to initiating the fieldwork.

In addition to the mechanical integrity tests, a temperature survey and ambient pressure test was run on Well #2-12 to assist in evaluating the injection zone and formation condition.

2.0 SUMMARY OF RESULTS

An annulus pressure test (APT) was performed on July 25, 2016 to demonstrate that there is no significant leak in the tubing, casing or packer. The fluid-filled annulus was pressurized to 983-psi for one (1) hour. There was a 10 psi loss in pressure for the duration of the test. This constitutes a successful pressure test with a 1% change in pressure.

A temperature survey (TS) was run on July 25, 2016 from surface to 4186 feet. The survey displayed no indication of a loss of external mechanical integrity and did not display any signs of upward fluid movement into unpermitted formations.

A Radioactive Tracer Survey (RTS) was run on August 8, 2016 to test the bottom hole cement. The RTS survey confirmed the leak-free condition of the tubing within the test interval as well as depicting that all injected fluids exited the injection tubing

below the packer and moved out into the injection zone. The RTS further verified that the cement at the top of the injection interval has integrity and there is no upward migration of injection fluids around the casing shoe.

Ambient pressure monitoring was performed on August 10th and August 11th 2016. The results are summarized below.

- Time to radial flow: 1.83 hours following shut-in.
- Permeability: 90 md
- Skin factor: 19
- Pressure loss: 190 psi
- Flow efficiency: 0.30

3.0 ANNULUS PRESSURE TESTING

The APT was performed on Well #2-12 on July 25, 2016. This test was performed to confirm the integrity of the injection string, long string casing, the wellhead and the packer.

3.1 Annulus Pressure Test Procedures

The procedures for the APT were submitted to the EPA and can be found in Appendix A of this report. The procedures involve the pressuring up of the annulus and should be monitored for one (1) hour. Pressures should be monitored and recorded on ten (10) minute intervals for the entire hour test.

3.2 Annulus Pressure Test Results

The annulus pressure test on Well 2-12 was pressured up on July 25, 2016 to 983 psi and stabilized at 0850. The pressure was monitored by an APG Digital Model PG 3000; serial number U0951, (0-3000 psi) gauge that was calibrated on February 22, 2016. During the one (1) hour test the total change of pressure was a rise of one (1) psi to 974 psi. This change of ten (10) psi represents a pressure change of 1% psi, the allowable change of 3% (29.49). This test demonstrates mechanical integrity.

The test was witnessed by Jack Lanigan of MDEQ, John Frost of EGT and Rich Schildhouse of PB. The MDEQ report as well as the gauge calibration certificate are included in Appendix D.

4.0 TEMPERATURE SURVEY

In response to a regulatory requirement, a temperature survey was run on July 25, 2016 on Well #2-12. The purpose of the requirement is to insure that there is no evidence of any upward movement of fluid that may travel toward the Underground Source of Drinking Water (USDW).

4.1 Temperature Survey Procedures

The procedures for the temperature survey are found in Appendix A of this report which was submitted and approved by the U.S. EPA before any fieldwork was started. The temperature tool calibration was confirmed by using a bucket test incorporating the use of both cold and hot water as well as a digital meter. This test is displayed at the beginning of the temperature log which can be found in Appendix F. The base temperature was run from surface down to 4186 feet.

4.2 Temperature Survey Results

The last two times that temperature surveys were run on Well #2-12 were January 13, 2013 and June 27, 2013. The data that was collected at that time was compared to the July 25, 2016 data and is displayed in the Table below.

WELL #2-12						
Depth	July 25, 2016	Gradient/ 1000'	January 13, 2013	Gradient/ 1000'	June 27, 2013	Gradient/ 1000'
100	79.5		44.2		52.5	
500	52.2	68.3	53.2	22.5	52.1	1.0
1000	55.0	5.6	55.8	5.2	54.9	5.6
1500	57.7	5.4	58.6	5.6	57.6	5.4
2000	60.2	5.0	60.6	4.0	60.2	5.2
2500	64.6	8.8	66.1	11.0	65.3	10.2
3000	73.2	17.2	75.8	19.4	75.2	19.8
3500	78.1	9.8	80.0	8.9	79.6	8.8
4000	81.0	5.8	84.8	9.6	84.0	8.8
4100	81.5	5.0	85.9	11.0	85.2	12.0

As can be seen in the table above, both the actual temperatures and calculated gradients obtained July 25, 2016 are consistent with images from the January 2013 and June 2013 logs. The temperature recorded for all three (3) logs are extremely close in comparison. The temperatures of the 2016 log below 4000' (open hole) seem to be slightly cool reflecting higher injection rate caused by cleaning efforts over the last few years. There are a few other interpretations that have to be made. First, the temperature at top of fluid for 2016 is higher which can be attributed to the actual top of fluid in the well over the past years. Another factor is the temperature of the thermister before it reaches the fluid. Secondly cooling is present at 3985', 4110' and 4180', which can be expected due to cleaner rock at the bottom of the 7" casing.

This log confirms that there is no fluid movement upward out of the injection zone (3382').

5.0 RADIOACTIVE TRACER SURVEY

In order to verify that no fluid is moving upward around the casing shoe, a radioactive tracer log is run. Interpretation of the RTS indicates whether or not there is migration of injection fluids through channels in the cement sheath surrounding the protection casing.

This RTS is run by first recording a base gamma ray log over the interval of interest. Fluid is injected and a radioactive slug of Iodine 131 is released above the area to be tested. Fluid is injected and the progress of the slug monitored by repeatedly lowering the logging tool below the moving slug and logging upward through the slug. A second verification of the absence of upward fluid movement is obtained by releasing a slug of Iodine 131 above the area to be tested. The logging tool is set at the depth of interest and gamma radiation is recorded for approximately 30 minutes with the logging tool stationary. A final gamma ray survey is run to complete the logging procedure.

5.1 Radioactive Tracer Survey Procedure

The procedures for RAT were submitted to the EPA and can be found in Appendix A.

5.2 Results of the Radioactive Tracer Survey

An RTS was run between 4194 feet and 3039 feet injection Well #2-12 on August 8, 2016. The log can be found in Appendix G.

- A. First Base Log: 4194 feet to 3039 feet
- B. Five (5) minute statistical check at 3955 feet
Five (5) minute statistical check at 3800 feet

C. First radioactive slug ejected at 3750 feet.

Stationary time drive sequence

Fluid pump rate – 30-32 G PM

Injection pressure 245 psi

Bottom detector set at 3977 feet

Top detector set at 3971 feet

Monitored for 34 minutes

D. Second radioactive slug ejected at 3100 feet. The following table contains
The depth of the top and bottom of each pass and the depth of the peak.

	START	STOP	PEAK DEPTH	FLOW GPM
1	3154	3134	3146	30
2	3230	3173	3204	30
3	3362	3328	3346	30
4	3514	3475	3497	30
5	3679	3636	3661	30
6	3687	3648	3668	30
7	3887	3826	3864	30
8	4006	3954	3982	30
9	4006	3982	3996	30
10	4030	3990	4015	30
11	4073	3990	4030	30

E. Final Base Log 4081 feet to 3922 feet

The radioactive tracer run in Well #2-12 on August 8, 2016 confirmed the leak-free condition of the tubing within the test interval as well as depicting that all injection fluids exited the injection tubing below the packer and moved out into the injection zone. The RTS verified that the cement at the

top of the injection interval has integrity and there is no upward migration of injection fluids around the casing shoe.

6.0 AMBIENT PRESSURE MONITORING

In accordance with the United States Environmental Protection Agency's (U.S. EPA), requirements for the Class I UIC permit number MI-163-1W-CO11 granted to Environmental Geo-Technologies, LLC (EGT) and with the State of Michigan permit number M-453, a bottom hole pressure falloff test (Ambient Pressure Monitoring) was run on Well #2-12 to assist in evaluating the injection zone.

John Frost from EGT, Craig Merges from J.O. Well Service and Testing, and Richard Schildhouse from PB witnessed the Ambient Pressure Monitoring test which was run from August 9, 2016 to August 10, 2016.

6.1 AMBIENT PRESSURE MONITORING PROCEDURES

Procedures for performing the Ambient Pressure Monitoring were submitted to the regulatory agencies prior to doing any field work. A copy of those procedures can be found in Appendix A of this report.

6.2 AMBIENT PRESSURE MONITORING RESULTS

All depths in this report, unless otherwise noted, are referenced to the Kelly Bushing (KB) elevation which is 13 feet above the ground level elevation for Well #2-12. J.O. Well Services ran bottom-hole pressure gauges into Well #2-12 and set the gauges at 3950 feet KB on August 10, 2016.

Injection into Well #2-12 began at 07:39 AM on August 10, 2016 and continued until 07:48 PM on August 10, 2016, at which time Well #2-12 was shut in for the pressure falloff portion of the testing. The pressure falloff was monitored for approximately 12 hours. PB analyzed the test data with the assistance of the commercially available software program PanSystem3.5[©]. The PanSystem3.5[©] output for the analysis of this test is presented in Appendix E. J.O. Well Service and Testing, Inc.'s pressure test report and gauge calibration certificates are presented in Appendix C.

Table I lists general information as well as the reservoir characteristics for this well. Table II lists data pertinent to the current test. Table III lists the duration and final pressure measured during the pressure falloff test.

Figure 1 shows the bottom-hole pressure data that was recorded during both the injection and falloff periods of the testing on Well #2-12. Figure 2 is a Cartesian plot of the bottom-hole pressure data versus elapsed time recorded during the falloff period. The first step of the analysis consisted of generating a log-log diagnostic plot of Δp and the Δp derivative versus equivalent shut-in time (Figure 3) to determine the time at which radial flow begins. From the log-log diagnostic plot, radial flow begins at an elapsed time following shut in of 1.83 hours.

The formation mobility-thickness, kh/μ , was obtained from the slope of the line passing through the pressure data which occurred during the radial flow period (depicted in Figure 3) on the Horner semi-log plot (Figure 4). Figure 5 is an expanded view of Figure 4. The radial flow period begins at an elapsed Horner time following shut in of 0.88 and continues to the end of the test. The slope of the straight line passing through this region is 11.762 psi/log cycle. The following equation is used to calculate mobility-thickness:

$$\frac{kh}{\mu} = 162.6 \frac{qB}{m}$$

where:

- kh/μ = mobility-thickness, md-ft/cp
- 162.6 = constant
- q = flow rate, barrels per day
- m = slope of semi-log line, psi/log cycle
- B = formation volume factor, reservoir volume/surface volume

Using the following values, the mobility-thickness is found to be 14,990 md-ft/cp:

- q = 31.63 gpm = 1084.30 barrels/day
- m = 11.762 psi/log cycle
- B = 1.0 reservoir barrel/surface barrel

$$\frac{kh}{\mu} = 162.6 \frac{(1084.30)(1.0)}{11.762}$$

$$= 14,990 \text{ md} - \text{ft}/\text{cp}$$

The permeability-thickness, kh , was determined to be 11,962 md-ft by multiplying the mobility-thickness, kh/μ , by the viscosity of the waste fluid of 0.798 centipoise:

$$kh = \left[\frac{kh}{\mu} \right] \mu$$

$$= (14,990)(0.798)$$

$$= 11,962 \text{ md-ft}$$

The formation permeability, k , was found to be 89.94 md using the formation thickness of 133 feet:

$$k = \frac{kh}{h}$$

$$= \frac{11,962}{133}$$

$$= 89.94 \text{ md}$$

The following equation is used to calculate the formation skin factor:

$$s = 1.151 \left[\frac{p_{wf} - p_{thr}}{m} - \log \left(\frac{k}{\phi \mu c_t r_w^2} \right) + 3.23 \right]$$

where:

- s = formation skin factor, dimensionless
- 1.151 = constant
- p_{wf} = pressure immediately prior to shut-in, psia
- p_{1hr} = pressure at a time of one-hour from the semi-log straight line, psia
- m = slope of the semi-log straight line, psi/cycle
- k = formation permeability, md
- ϕ = formation porosity, fraction
- μ = formation viscosity, centipoise
- c_t = total compressibility of formation and fluid, psi^{-1}
- r_w = wellbore radius, ft
- 3.23 = constant

Using the following values, the skin factor is found to be 18.59

where:

- p_{wf} = 2120.87 psia
- p_{1hr} = 1862.00 psia
- m = 11.762 psi/log cycle
- k = 89.94 md
- ϕ = 11%
- μ = 0.798 cp
- c_t = $6.2 \times 10^{-6} \text{ psi}^{-1}$
- r_w = 0.3646 feet

$$s = 1.151 \left[\frac{2120.87 - 1862.00}{11.762} - \log \left(\frac{89.94}{(0.11)(0.798)(6.2 \times 10^{-6})(0.3646)^2} \right) + 3.23 \right]$$
$$= 18.59$$

The change in pressure, Δp_{skin} , in the wellbore associated with the skin factor was determined to be 190.01 psi using the slope of the straight-line portion of the radial flow plot, the calculated skin factor, and the following equation:

$$\begin{aligned}\Delta p_{\text{skin}} &= 0.869(m)(s) \\ \Delta p_{\text{skin}} &= 0.869(11.762)(18.59) \\ \Delta p_{\text{skin}} &= 190.01 \text{ psi}\end{aligned}$$

The flow efficiency (E) was determined from the following equation where:

$$E = \frac{p_{\text{wf}} - p^* - \Delta p_{\text{skin}}}{p_{\text{wf}} - p^*}$$

- E = flow efficiency, fraction
- p_{wf} = flowing pressure prior to shutting in the well for the falloff, 2120.87 psia
- p^* = pressure extrapolated to an infinite shut-in time from the straight-line portion of the radial flow plot, 1848.83 psi
- Δp_{skin} = pressure change due to skin damage, 190.01 psi

Substituting these values, the flow efficiency was calculated to be 0.30

$$\begin{aligned}E &= \frac{2120.87 - 1848.83 - 190.01}{2120.87 - 1848.83} \\ &= 0.30\end{aligned}$$

A summary of the results of the pressure falloff analysis is presented in Table IV.

7.0 CONCLUSIONS

In conclusion, the Environmental Geo-Technologies, LLC Well #1-12 has displayed internal and external mechanical integrity. All procedures and evaluations have been done in accordance with state and federal requirements mandated in regard to U.S. EPA Permit MI-163-1W-C010 and Michigan Permit M-452.

- There is no significant leak in the casing, tubing or packer as evidenced by an annulus pressure test conducted on July 25, 2016.
- The temperature survey that was run on July 25, 2016 was comparable to the previous surveys conducted on December 4, 2012 and June 26, 2013. The 2016 survey displayed no indication of any fluid having an upward movement, thus confirming external integrity.
- The cement at the top of the injection interval and around the casing shoe has integrity. The survey that was run on August 8, 2016 indicated that all fluids left the injection string and entered into the formation and showed no indication of upward movements.

TABLE I

GENERAL WELL AND RESERVOIR INFORMATION

Date of Test	August 10 – 11, 2016
Wellbore Radius	0.3646 feet
Net Interval Thickness	133 feet
Average Historical Waste Fluid Viscosity	0.798 centipoise
Specific Gravity (estimated)	1.0
Porosity	11%
Total Compressibility	$6.2 \times 10^{-6} \text{ psi}^{-1}$
Formation Volume Factor	1 RB/STB

TABLE II

DATA SUMMARY FOR INJECTION PERIOD

Start Injection	August 10, 2016; 07:39 AM
Stop Injection	August 10, 2016; 07:48 PM
Time of Injection Period	12 hours
Test Fluid	Plant waste
Average Injection Rate	31.63 gpm (1084.30 bpd)
Pumps Used for Test	Plant Pumps
Final Injection Pressure	2120.87 psia
Gauge Depth	3590 feet KB
Gauge Type/Serial No.	PR-625/No. 9847
Gauge Sensitivity:	resolution 0.15 psi
	accuracy 2.44 psi

TABLE III
DATA SUMMARY FOR FALLOFF PERIOD

Total Shut in Time	12 hours
Final Shut in Pressure	1852.51 psia

TABLE IV
COMPARISON OF ANALYSIS RESULTS

Results From Log-Log and Horner Plots				
Parameter			Log-Log Plot Results	Superposition Plot Results
Wellbore Storage	C_s	bbls/psi	0.0012	-
Mobility-Thickness	kh/μ	md-ft/cp	14,833	14,990
Permeability-Thickness	kh	md-ft	11,837	11,962
Permeability	k	md	89	90
Skin Factor	s	-	-	19
Pressure Drop due to Skin	$(\Delta p)_s$	psi	-	190
Flow Efficiency (Condition Ratio)	FE	-	-	0.30

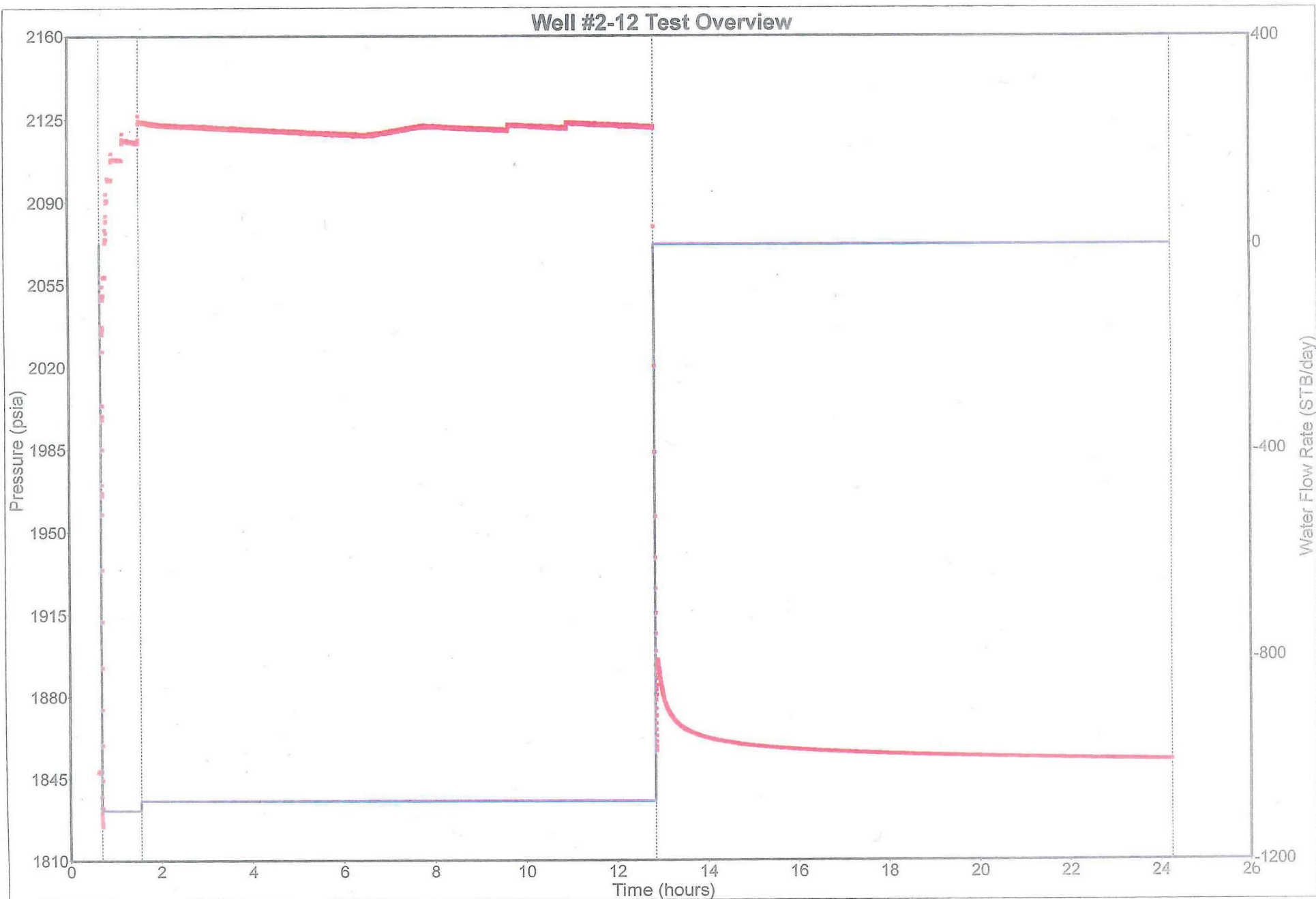


Figure 1

Well #2-12 Cartesian Plot

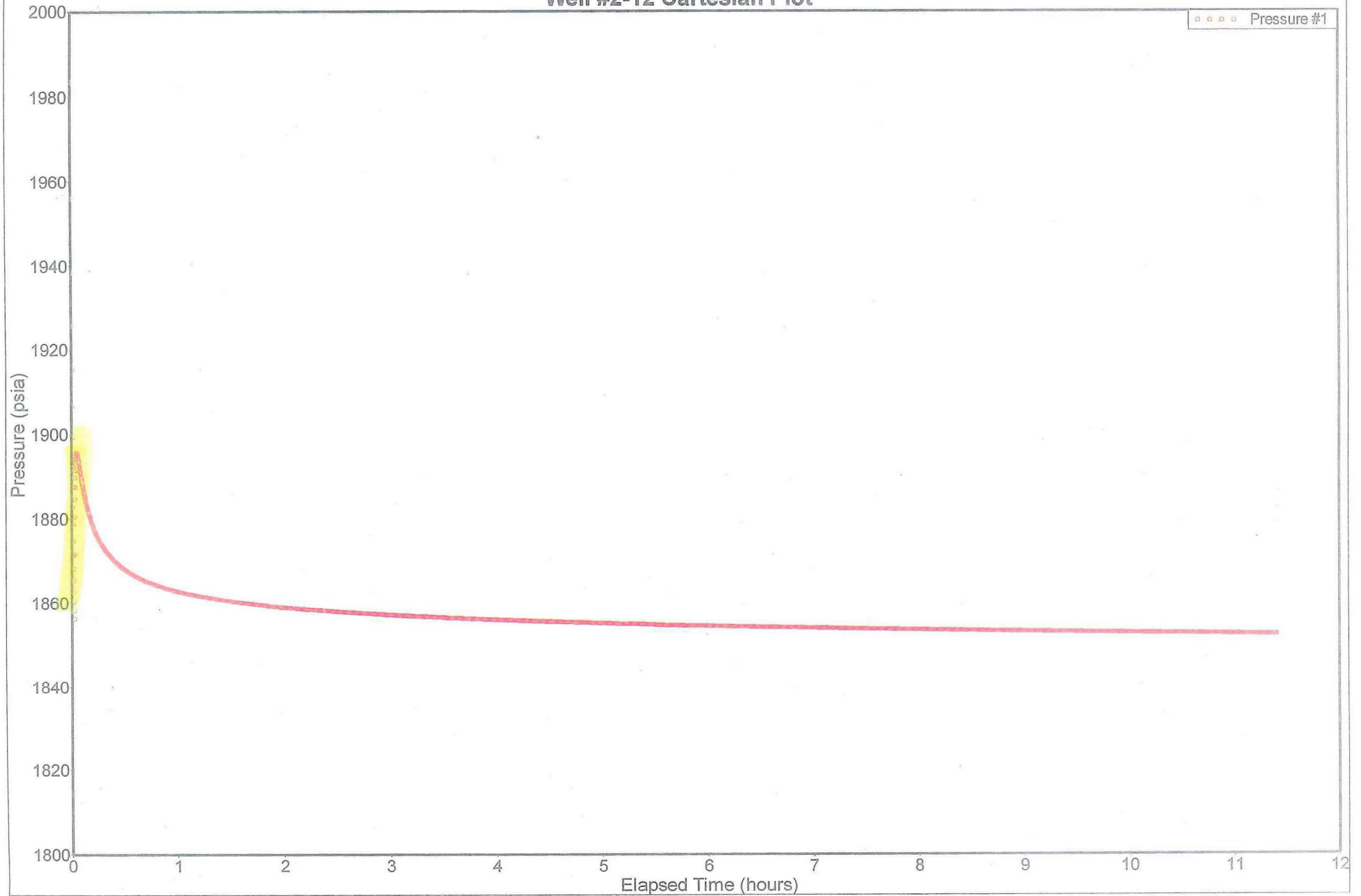


Figure 2

Well #2-12 Log-Log Plot

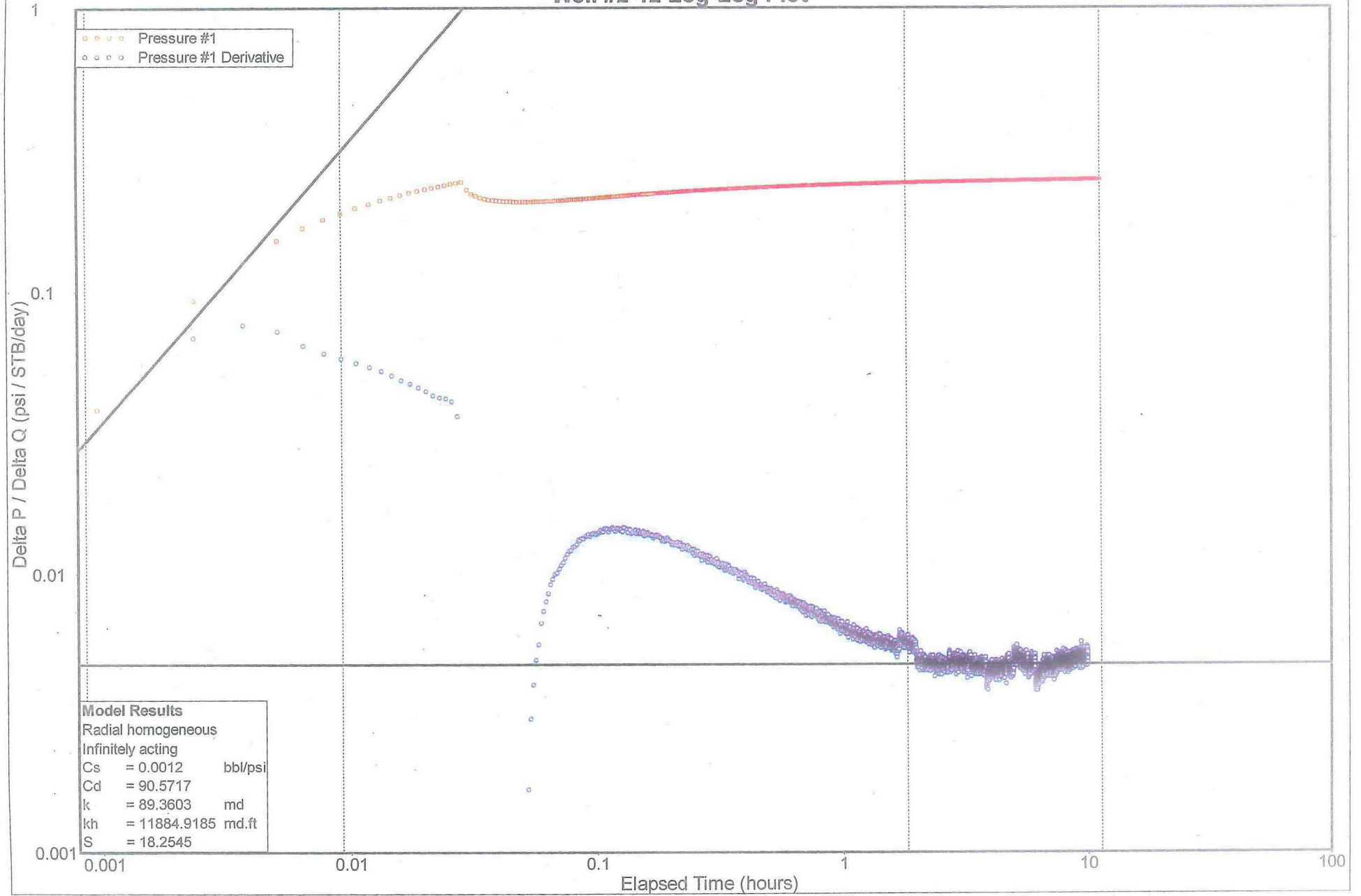


Figure 3

Well #2-12 Radial Flow Plot

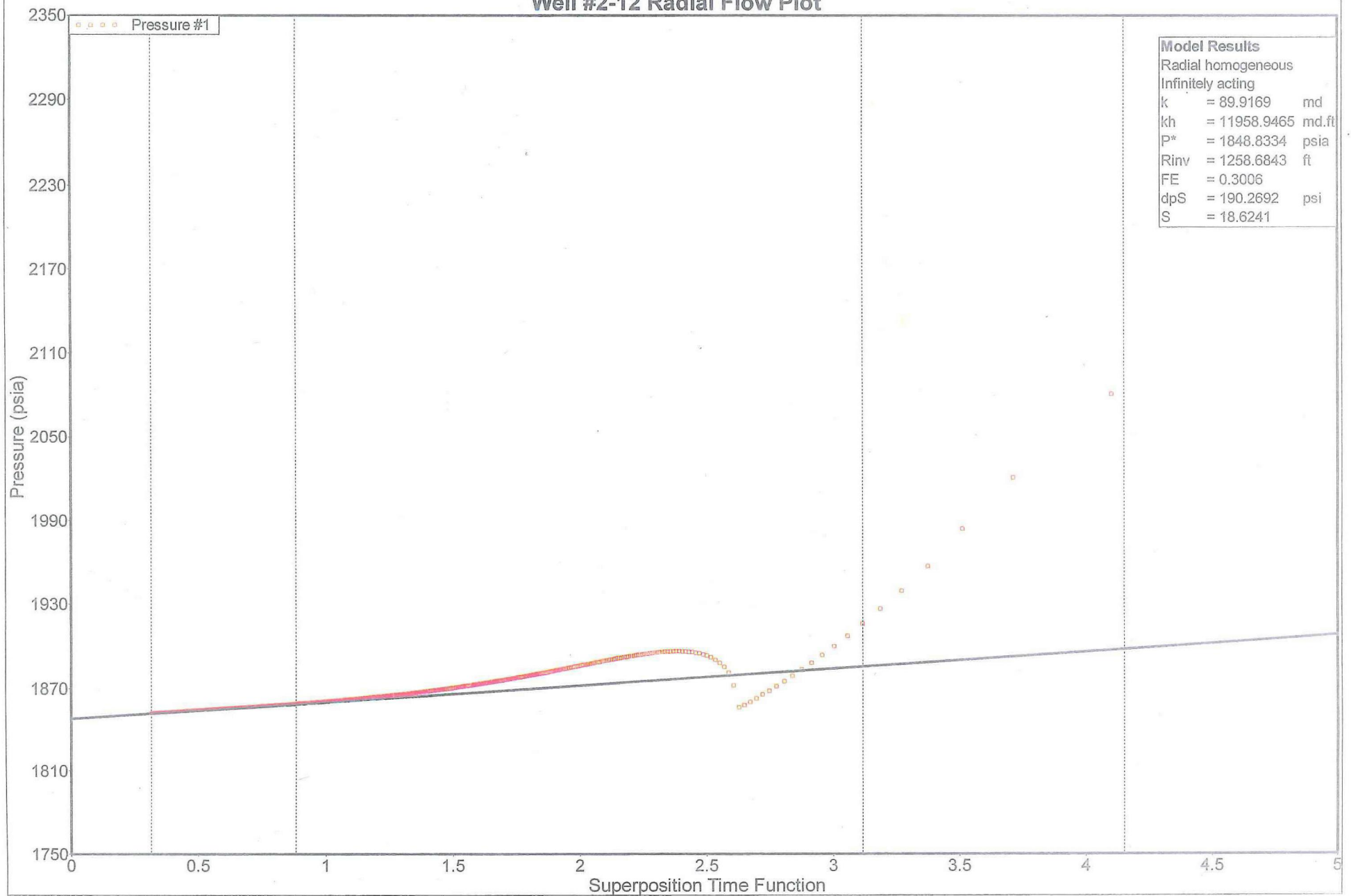


Figure 4

Well #2-12 Radial Flow Plot

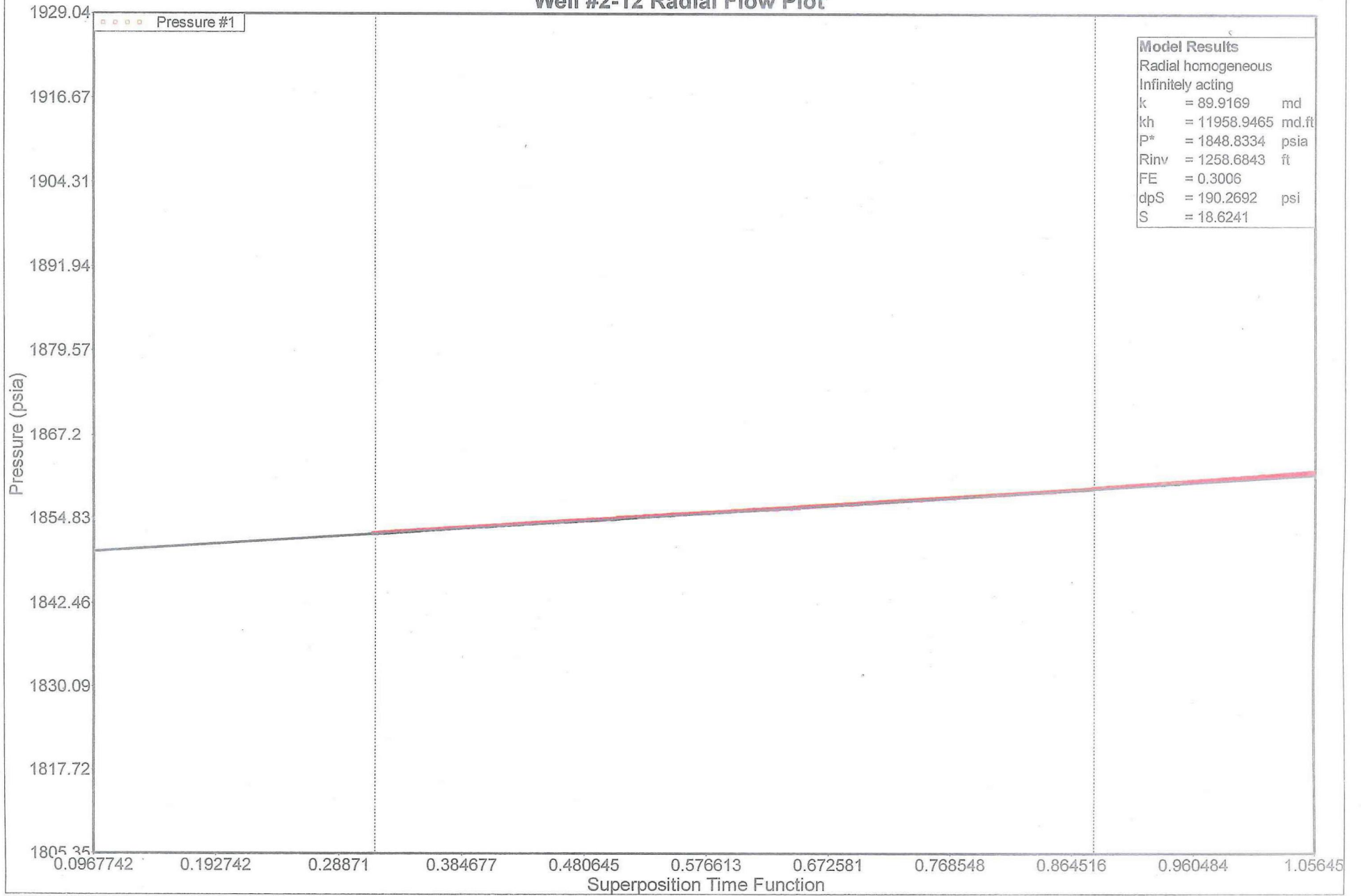
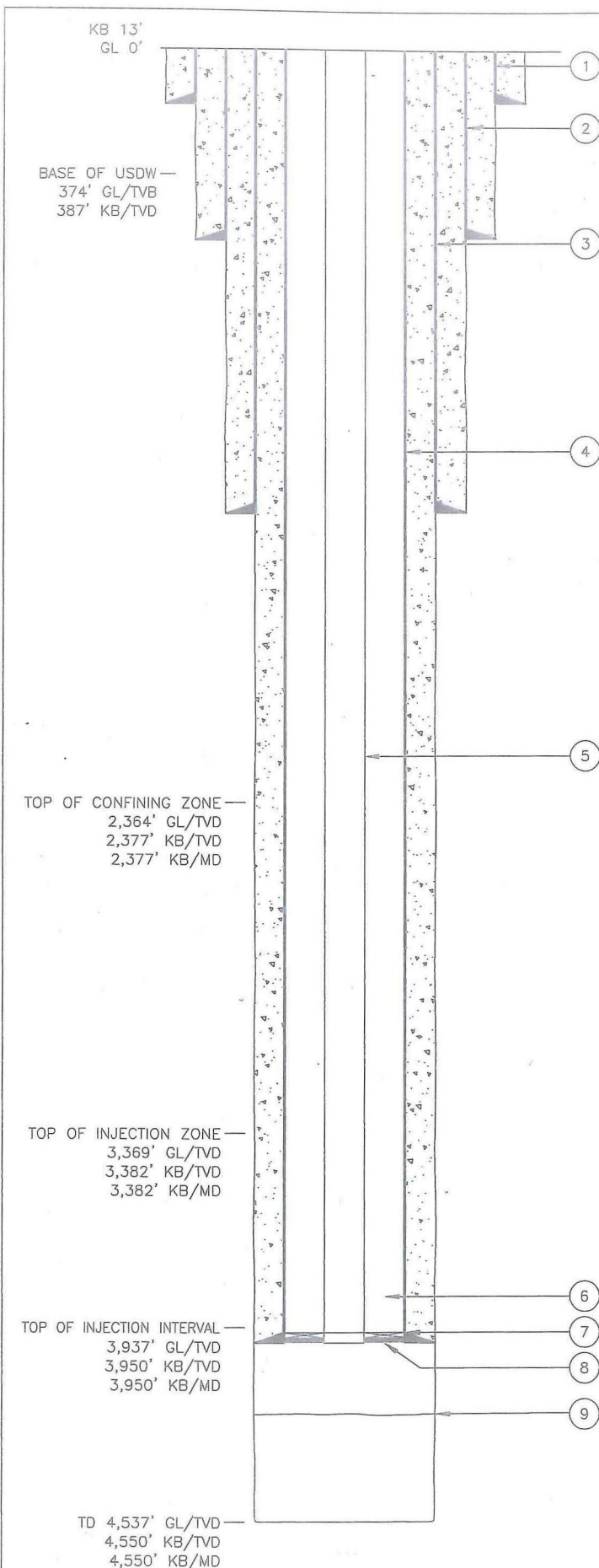


Figure 5



BELOW GROUND DETAILS

- ① CONDUCTOR CASING: 20" O.D., 94 lb/ft, SET AT 169' KB/MD, 169' KB/TVD IN 24" HOLE AND CEMENTED TO SURFACE
- ② SURFACE CASING: 13 $\frac{3}{8}$ " O.D., 48 lb/ft, H-40 SET AT 598' KB/MD, 598' KB/TVD IN 17 $\frac{1}{2}$ " HOLE AND CEMENTED TO SURFACE
- ③ INTERMEDIATE CASING: 9 $\frac{5}{8}$ " O.D., 36 lb/ft, J-55 SET AT 1,444' KB/MD, 1,444' KB/TVD IN 12 $\frac{1}{4}$ " HOLE AND CEMENTED TO SURFACE
- ④ LONG STRING CASING: 7" O.D., 26 lb/ft, J-55 SET AT 3,983' KB/MD, 3,983' KB/TVD IN 8 $\frac{3}{4}$ " HOLE AND CEMENTED TO SURFACE
- ⑤ INJECTION TUBING: 4-1/2" O.D. FIBERGLASS TO 3,953' KB/MD, 3,953' KB/TVD
- ⑥ ANNULUS FLUID: OIL BASED FLUID
- ⑦ PACKER AND SEAL ASSEMBLY: 4-1/2" X 7" GPS PACKER, TOP AT 3,953' KB/MD, 3,953' KB/TVD. BOTTOM AT 3,958' KB/MD, 3,958' KB/TVD
- ⑧ DIESEL PAD UNDER PACKER
- ⑨ TOP OF FILL AT 4,180' KB/MD, 4,180' KB/TVD

NOTE: GROUND LEVEL ELEVATION 626.6'



FIGURE 6
ENVIRONMENTAL GEO-TECHNOLOGIES, LLC
ROMULUS, MICHIGAN

EGT #2-12 WELL SCHEMATIC

DATE: 9/13/16	CHECKED BY: RWS	JOB NO: 50909A
DRAWN BY: CRB	APPROVED BY: RWS	DWG. NO:



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUL 14 2016

REPLY TO THE ATTENTION OF:
WU-16J

CERTIFIED MAIL 7014 2870 0001 9579 6273
RETURN RECEIPT REQUESTED

Richard J. Powals
Vice-President
Environmental Geo-Technologies, LLC
28470 Citrin Drive
Romulus, Michigan 48174

Subject: Approval of Proposed Procedures for Testing in the Environmental Geo-Technologies #1-12 and #2-12 Wells, U.S. Environmental Protection Agency Underground Injection Control Permit #MI-163-1W-C010 and #MI-163-1W-C011, July 2016

Dear Mr. Powals:

The U.S. Environmental Protection Agency has reviewed and hereby approves the procedures proposed in your letter of June 20, 2016, for the testing referenced above with several conditions.

A copy of the pressure gauge calibration certificate for each gauge used during the testing (Standard Annulus Pressure Test and Ambient Reservoir Pressure Monitoring) should be submitted with your report.

I am enclosing information sheets for these tests. We request you fill in the blank cells and confirm the data in the gray cells and return the information sheets with the test results and interpretation, and up-to-date well schematics. This will help ensure that all the information we require for interpretation of the test will be included in your submission. Any anomalies in test results should be discussed. For example, both 2015 fall-off tests showed unusual behavior that was not initially discussed in EGT's reports. Note also that the differences between the two fall-off tests should be discussed. When reporting depths from the deviated well, please make it clear whether the depths are measured depths or true vertical depths, as appropriate. Please remember to submit the digital data either on CD or by email when you submit your report. Note that if the tests do not provide definitive information concerning the conditions which they are designed to ascertain, or approved procedures are not followed, you will be required to rerun them.

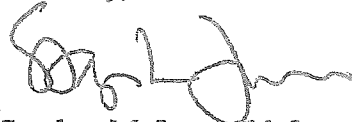
EPA cannot determine whether these tests will satisfy EGT's UIC permit requirements until the results have been submitted and analyzed. All mechanical integrity tests must

be approved by the Director, which can only be done after the test results have been reviewed. The procedures you submitted should provide acceptable results, if the tests are properly conducted and the results properly interpreted.

It is our practice that testing be witnessed by an EPA staff member or our contract field inspector to the extent possible. Please contact Jeff McDonald at (312) 353-6288 to schedule the witnessing of these tests. Unwitnessed tests are only acceptable if it is impossible for an EPA staff member or the field inspector to be present.

If you have any questions about this letter or if you find during the test that you are unable to follow the approved procedures, please contact Stephen Roy of my staff by phone at (312) 886-6556 or by email to roy.stephen@epa.gov.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Stephen M. Jann', written over a horizontal line.

Stephen M. Jann, Chief
Underground Injection Control Branch

Enclosures

cc: Sam Williams (email only with procedure)

Ray Vugrinovich, Michigan Department of Environmental Quality (email letter only)

Rich Schildhouse, WSP | Parsons Brinckerhoff (email only)